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THE ANALYSIS OF HIGH TEMPERATURE IMPACT ON EPITAXIC STRUCTURES AND CONTACT SYSTEMS FOR PHOTOELECTRIC TRANSDUCERS

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The improvement of the quality of traditional materials as well as mastering new semi-conducting ones and various types of metallization lead to the elaboration of a series of classes of optoelectronic devices [1-3]. Especially great perspectives are promised by application of epitaxic structures for the production of photoelectric tranducers (PET).

The analysis demonstrates, that the most significant origin of defects in epitaxic structures is the tension in the course of crystallization or further cooling. In very thin membranes the force of surface tension serves as additional source of impact, which depending on surface tension, can lead to compression or distension of additional layers. The resultant tension, plasticity of epitaxic structure, the width of layers, thermal conditions of growth and extra tension stimulate plastic deformation of epitaxic structures.

It was found out that thermal tension in epitaxic structures can be triggered by both the difference of coefficients of thermal distention of compositions and uneven distribution of the temperature within the grown layer.

The research was carried out on structure pads, made of monocrystalline silicon without dislocation, alloyed with antimony up to specific resistance of 10^{-4} Ohm/sm, and on SWR-3 pads on non-alloyed monocrystalline without dislocation of hole-type of conductivity with the specific resistance of 60-100 Ohm/m. The pads have undergone the standard cycle of mechanical processing, that includes cutting monocrystallines with diamond disk with inner cutting edge on the plate of 380 μm width with 28, 40 or 60 mm in diameter and of 500 μm width with 76 mm in diameter, polishing with diamond paste and chemo-mechanical polishing (CMP) with the suspension based on aluminosilicate. Structure defects in plates and ready-made composites were singled out with the help of chromic acid and investigated by means of metallographic methods, including 2-ray micro-interferometrics.

The plates on dislocation-free silicon of 60 mm in diameter 300, 500 and 1000 μm wide underwent annealing in the atmosphere of hydrogen under the temperature of 1450^{o}C during 10 minutes.

Authors propose an optimal mode of producing contact systems for PET on silicon epitaxic structures and comparative study of contact resistance and stability of Al, Al-Cu and Al-Cu-Si contacts was performed.

The research was carried out on special test structures with the size of 3,8 x 6,35 μm^2. The diameter of the plates was 76 mm, and their width was 500 μm. On the corresponding batch of plates Al, Al-Cu (2%) were put and Al-Cu (2%) - Si (1%) metallization of 0,8 μm width with magnetron pulverization on DC was performed.

LITERATURE

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